Appendix W
2014 Spring Runoff Report, Central Treatment Plant, Bunker Hill Superfund Site

OPERATIONS & MAINTENANCE SERVICES
CENTRAL TREATMENT PLANT
BUNKER HILL SUPERFUND SITE
KELLOGG, IDAHO

SPRING 2014 RUNOFF REPORT

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EXECUTIVE SUMMARY

The spring runoff event of 2014 impacted operations at the Bunker Hill Central Treatment Plant (CTP), although to a lesser extent than the runoff events of 2012, 2011 and 2008. The most important fact is that the CTP had no zinc exceedances in 2014, compared to one in 2011 and 15 in 2008.

The 2014 spring runoff did not have a distinct beginning. Kellogg Tunnel (KT) zinc concentrations slowly increased after February and peaked at 269 mg/L on May 22nd. The highest monthly average KT zinc concentration in 2014 was 177 mg/L in May.

The KT flow is typically 1,400-1,500 gpm but peaked at 2,194 gpm on May 20th. The KT flow rate in 2014 did not substantially increase until May 6th and was over 2,000 gpm for about ten days in mid-May.

Lime demand and lime usage increased during this runoff event, but usage was lower than during the 2008, 2011 and 2012 runoff events. Lime usage averaged 6.7 tons/day in May 2014. To deal with the increased amount of solids during this period, the flocculent dosage was increased from the typical 2 ppm to about 4 ppm.

The pH set point was raised from 8.3 to 8.5 to reduce the chance of discharge exceedances. Several other minor process changes were implemented but 24-hour operator coverage was not required in 2014.

To support the CTP Upgrade Design, samples for selenium, thallium and other parameters were collected during this high-flow/high-strength period. Selenium concentrations were all well below the proposed discharge limit, which means that a separate treatment process for selenium will probably not be required. Three of the four thallium concentrations exceeded the proposed limit, so a treatment process for thallium may be required.

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1.0 PURPOSE

The purpose of this document is to document data and activities associated with the spring runoff event in 2014. Operations at the Bunker Hill Central Treatment Plant (CTP) were only slightly affected this year due to a combination of: a) good planning, b) prior experience with spring runoff events, and c) less severe runoff than in some years.

Changes in influent water quality, flow and lime demand, and subsequent effects on plant operations and effluent water quality are included in this report. This was the fourth noticeable spring runoff event in the past six years, following more significant runoff events in 2008, 2011 and 2012. There was no noticeable spring runoff in 2013.

2.0 INFLUENT WATER CHANGES

The 2014 spring runoff began in earnest when the Kellogg Tunnel (KT) flow rate increased from 1,632 gpm on May 5th to 1,916 gpm on May 6th. Runoff events in earlier years typically began in mid-May.

2.1 WATER QUALITY

One indicator of changing water quality is the KT concentrations that are sampled twice a week. However, laboratory analytical results from the KT are typically not seen until at least one week later, so KT data merely confirm what has already been observed in the plant. Probably the best indicator of overall water quality and lime demand is the KT zinc concentration. The KT zinc concentration was at an all-time low monthly average of 38 mg/L in February 2014, began to increase in March and April, and peaked at 269 mg/L on May 22nd (Figure 2-1). The average KT zinc concentration in May 2014 was 177 mg/L, which was below the 377 mg/L average seen in May 2011 but higher than typical. The lesser magnitude of the 2012 runoff, as measured by KT zinc concentration, is illustrated in Figure 2-2. Zinc concentrations were lower than in 2011, 2008 and 2012.

2.2 FLOW RATES

The KT flow rate in 2014 did not substantially increase until May 6th (Figure 2-3). The KT flow is typically 1,400-1,500 gpm, slightly higher in the spring, but was over 2,000 gpm for about ten days in mid-May. A higher KT flow also increases lime demand.

2.3 SPECIAL SAMPLING

To support the CTP Upgrade Design, it was determined that additional samples for selenium (Se) and thallium (Tl) needed to be collected during a high-flow/high-strength period. The primary purpose for this sampling was to determine whether Se and Tl exceed the probable future discharge limits for these parameters, and whether treatment processes for Se and Tl need to be incorporated into the CTP Upgrade Design. Four samples were collected during the 2014 high-flow event for:

- Total metals, including Se and Tl;
- Low-level mercury;
- Selenium speciation; and
- Sulfate and total dissolved solids (TDS).

FIGURE 2-1. KELLOGG TUNNEL ZINC

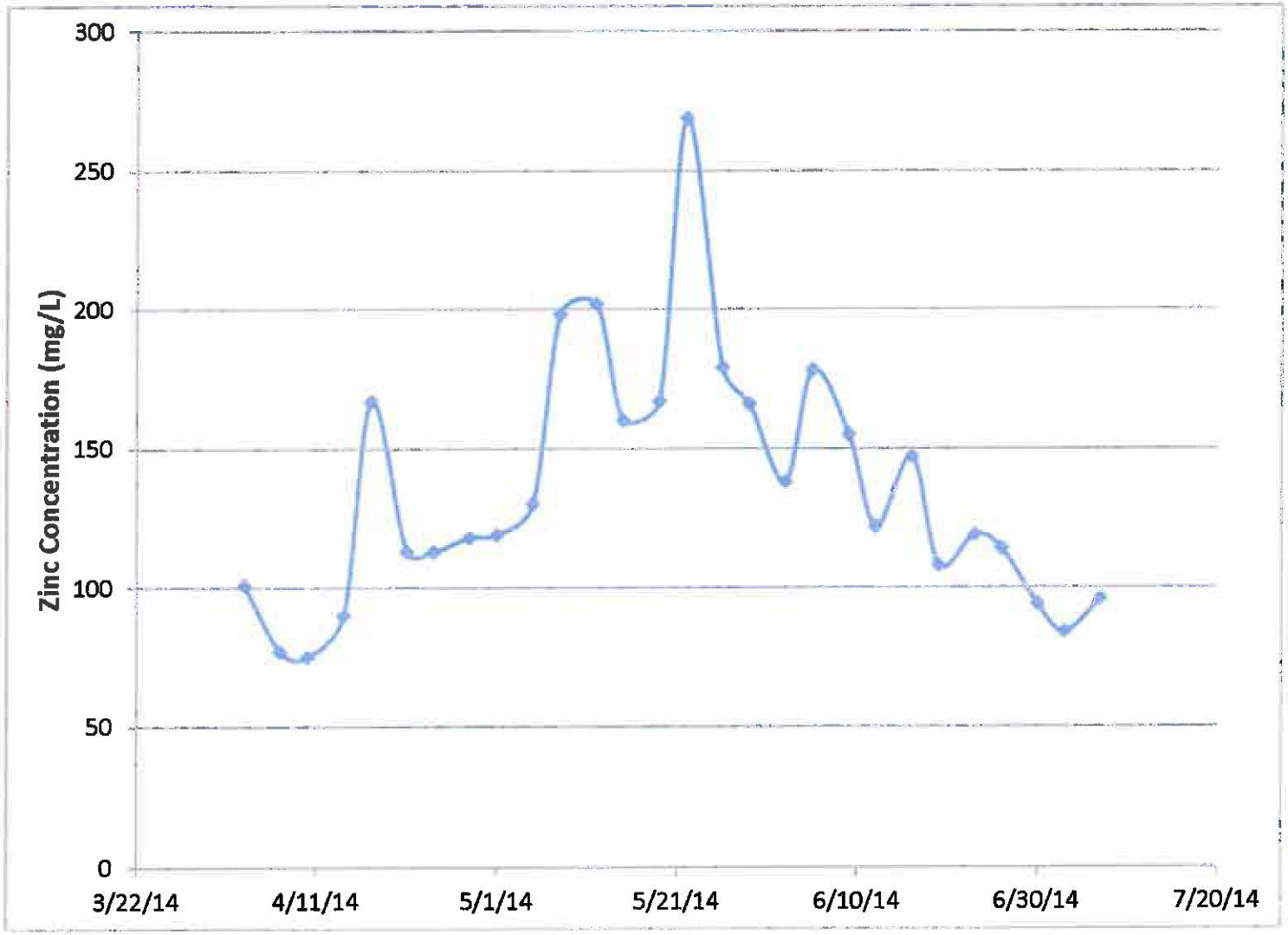


FIGURE 2-2. HISTORICAL KT ZINC DATA – MONTHLY AVERAGES

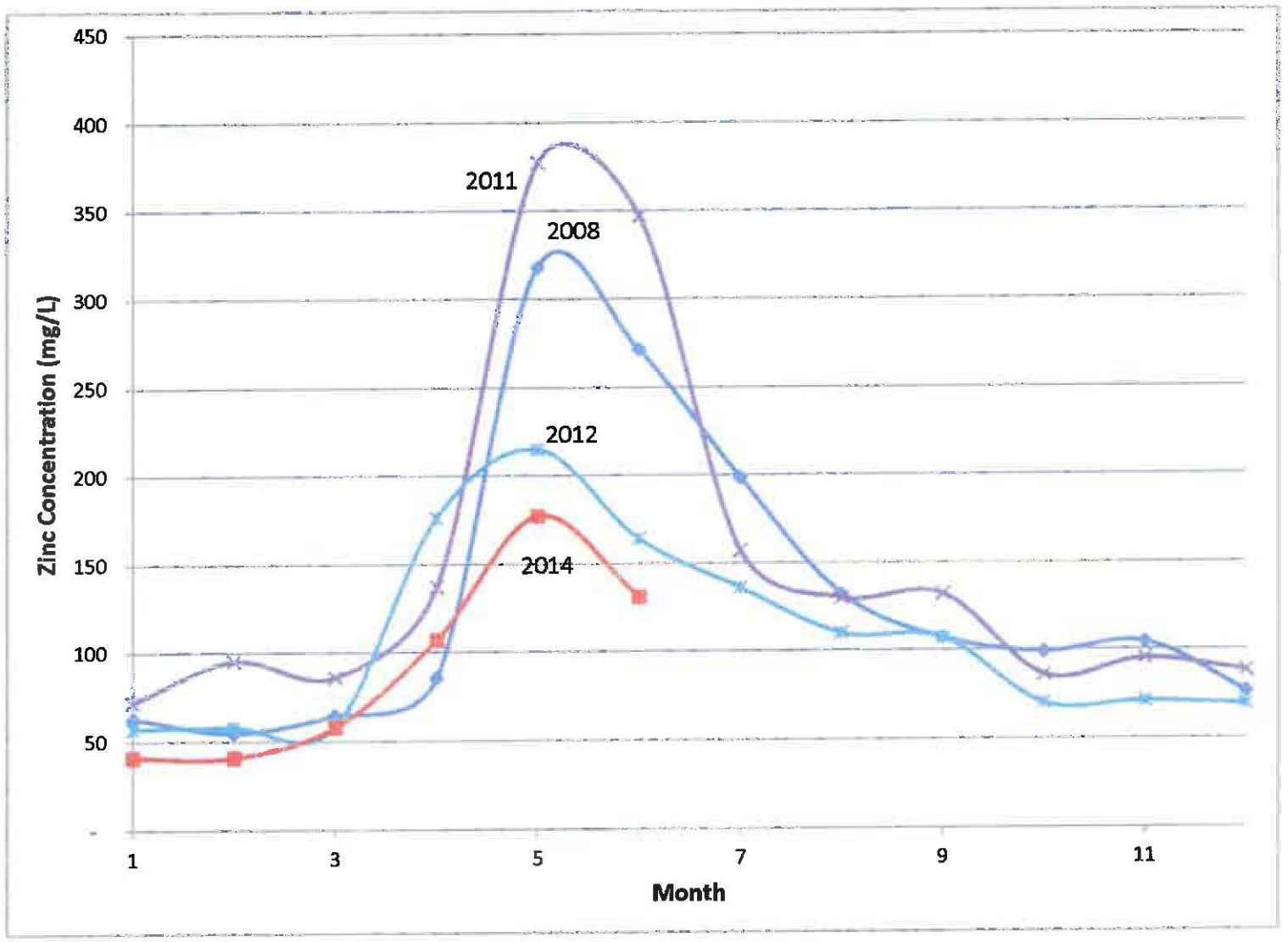
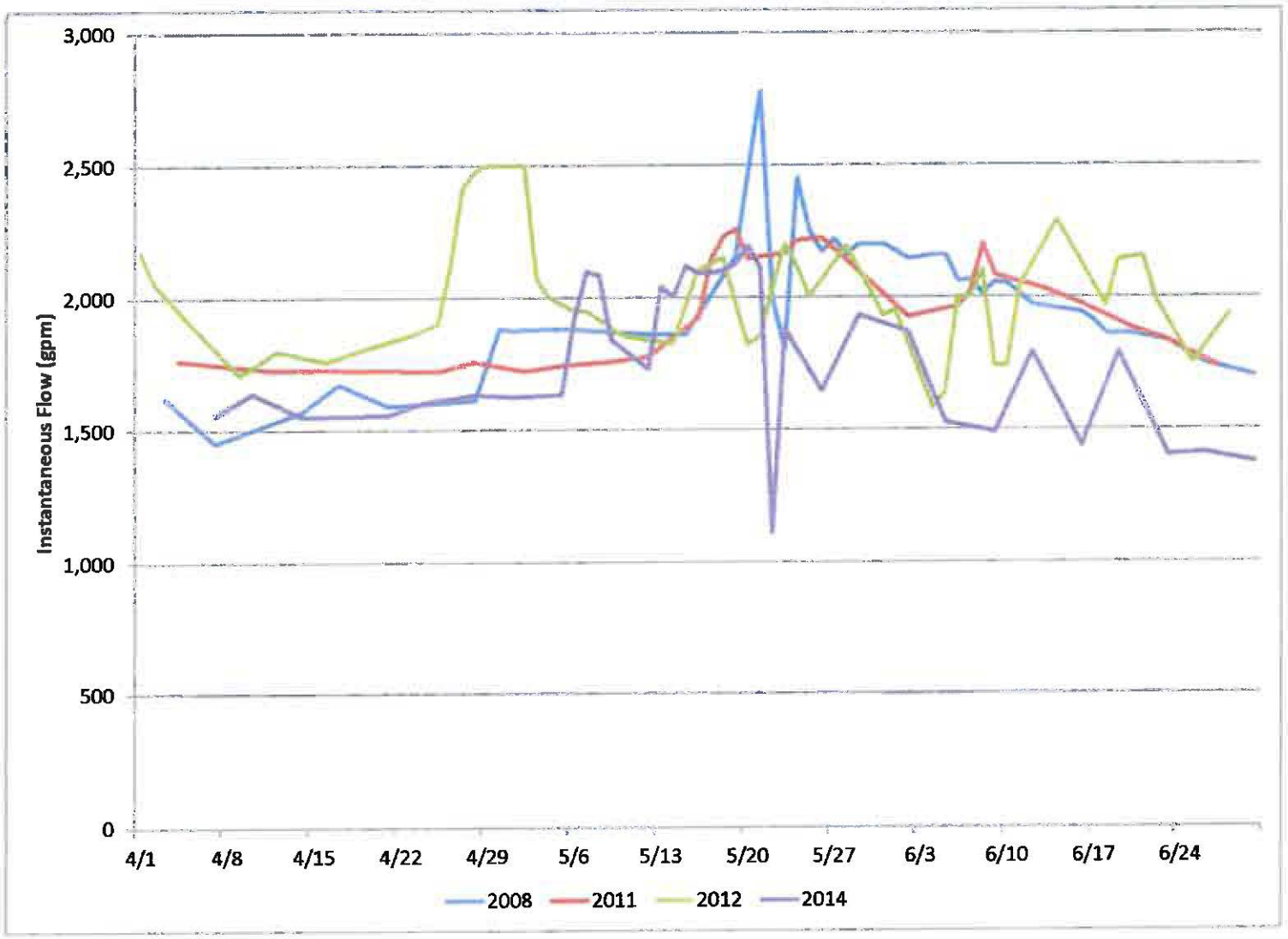


FIGURE 2-3. KT FLOW DURING HIGH-FLOW PERIODS



3.0 PLANT OPERATIONS

3.1 OPERATIONAL CHANGES

The CTP plant manager implemented several process changes to deal with the increased runoff and lime demand, namely increasing the:

- pH set point from the typical value of 8.3 to 8.4 and then 8.5; and
- "Open time" for the lime slurry valves from 20 seconds to 30 seconds; and
- Lime slurry concentration from the typical 10% solids to about 13% solids; and
- Floc dosage from the typical 2 ppm to 4 ppm.

3.1.1 Visual Effects

KT discharge is periodically burgundy-colored during spring runoff events. In 2014, KT water was only burgundy-colored during low-flow/high-strength events on April 17th and May 21st.

3.1.2 Lime Usage

Lime usage at the CTP is typically 2-3 tons of pebble lime per day, as shown in Table 3-1.

TABLE 3-1. LIME USAGE SINCE 2005

Time Period	Lime Usage (tons/day)
2005	2.59
2006	3.23
2007	2.76
2008 (including runoff event)	4.78
2008-2009	3.14
2009-2010	2.16
2010-2011 (including runoff)	4.31
2011-2012 (including runoff)	3.93
2012-2013	2.70
2013-2014	2.40

Lime usage averaged 6.72 tons/day in May 2014, following the general trend of increasing KT zinc concentrations shown in Figure 2-1. Lime demand never reached the levels seen in previous spring runoff events. Lime usage in May 2008 was as high as 40 tons/day.

3.1.3 Plant Coverage

In contrast to previous spring runoff events, 24-hour operator coverage was not required in 2014, which saved a substantial amount of money. The "pH swings" present in previous years did not occur in 2014.

3.2 EFFLUENT QUALITY

Effluent quality was excellent throughout the runoff event, with no NPDES exceedances for zinc or any other metals. This compares to 15 exceedances recorded during the 2008 runoff event and one during the 2011 runoff. Average zinc concentrations in the 006 samples were much lower and much more consistent in 2011, 2012 and 2014 than in 2008, as shown in Table 3-2.

TABLE 3-2. AVERAGE ZINC EFFLUENT CONCENTRATIONS

Month	Zinc Concentration (mg/L)
May 2008	1.55
June 2008	1.83
May 2011	0.19
June 2011	0.29
May 2012	0.27
June 2012	0.24
May 2014	0.30
June 2014	0.19

3.3 SAMPLING RESULTS

High-flow sampling results are shown in Table 3-3.

TABLE 3-3. HIGH-FLOW SAMPLING RESULTS

			Concentration (ug/L)			
Event #	Date	Flow (gpm)	Se	Se Limit	Tl	Tl Limit
1	5/6/14	1,916	0.83	4.1	0.64	0.47
2	5/7/14	2,097	1.1	4.1	0.60	0.47
3	5/20/14	2,190	0.85	4.1	0.60	0.47
4	5/21/14	1,125	1.4	4.1	0.18	0.47

Selenium results show that all samples had concentrations well below the proposed discharge limit of 4.1 ug/L, which means that a separate treatment process for selenium will probably not be required. Because all the selenium concentrations were less than 5 ug/L, no selenium speciation was performed.

Three of the four thallium concentrations exceeded the proposed limit of 0.47 ug/L. Therefore, a treatment process for thallium may be required, at least during spring runoff event.